SUBDIVIDED FIXED AMOUNT DISTRIBUTING APPARATUS FOR AEROSOL CONTAINERS

Background of the Invention

This invention relates to a subdivided fixed amount distributing apparatus for aerosol containers allowing only use of a fixed amount of aerosol contents such as medical products, hair care products, and cosmetic products in which a use amount for one cycle, such as e.g., one day, several days, or one week, is restricted.

Some aerosol contents contained in an aerosol container, such as medical products, hair care products, and cosmetic products may be used directly for human bodies. If such aerosol contents are used in an amount in excess of a prescribed use amount, such use may cause harm to human beings, or may result in wasteful use. As disclosed in Japanese Unexamined Patent Publication No.2001-232249, a subdivided amount distributing apparatus for aerosol containers has been developed in which the apparatus capable of spraying a prescribed fixed amount usable in a certain period for multiple times is connected to a stem of an aerosol container and disposed at an exterior of the aerosol container.

This subdivided amount distributing apparatus for aerosol containers is formed with a fixed amount chamber and a fixed amount injection valve, respectively, in the apparatus, and the aerosol contents of a fixed amount are introduced from the aerosol container main body into the fixed amount chamber and stored therein. The interior of the fixed amount chamber is normally pressurized with a piston, and the aerosol contents contained in the fixed amount chamber are injected multiple times in a subdivided manner through the fixed amount injection valve. Fixed amount injection during a prescribed period is allowed by injection of a fixed amount one or more times, thereby advantageously distributing aerosol contents such as medical products, hair products, and cosmetic products, which are otherwise not favorable when used in excess of a

prescribed amount or used in a wasteful manner.

The prior publicly known invention includes the subdivided amount distributing apparatus that is disposed at an exterior of the aerosol container. With such a subdivided fixed amount distributing apparatus connected to the exterior of the aerosol container, however, the prescribed amounts in proportion to one day or one week are stored in the fixed amount chamber in the prescribed period in a state that the aerosol contents are pressurized, so that the volume of the aerosol contents may expand due to changes of the outer temperature on some occasions. Thus the distributing apparatus disposed at the exterior of the aerosol container may be damaged. Because the contents are injected while the fixed amount chamber is pressurized by the piston, injection is made continuously upon gasification of liquid gas remaining at a space between the piston and the fixed amount chamber, even after the injection of the liquid portion of the aerosol contents is completed, thereby disadvantageously injecting only gasified gas. In addition, the fixed amount chamber and the fixed amount injection valve, or both, are required to be built in the distributing apparatus, thereby rendering assembly of the apparatus complicated and manufacturing costs high.

Summary of the Invention

This invention, to solve the above problems, does not require a large fixed amount chamber for injecting the contents plural times to an exterior of the aerosol container, because the aerosol contents of a fixed amount contained in the aerosol container main body are injected after being filled in the fixed amount chamber provided in the aerosol container, so that the distributing apparatus is prevented from receiving damage due to changes of external temperature, thereby allowing the aerosol container to be used stably and safely for a long period of time, thereby reducing the manufacturing costs.

This invention has a feature in which a subdivided fixed amount distributing apparatus for aerosol container includes: an outer sleeve secured to a top of the aerosol container and formed with a penetration opening at a center thereof; a nozzle body disposed in the penetration

opening of the outer sleeve and formed with a nozzle communicating with a stem; a pushing body penetrated by the nozzle at a center thereof and urged in an upper direction by a coil spring wound around the nozzle body, the pushing body pushing the stem by a downward force to open a fixed amount injection valve disposed in the aerosol container, thereby allowing injection of the entire amount of aerosol content that is within the fixed amount injection valve, the pushing body being pivotally movable with respect to the nozzle body and the outer sleeve; an upper sleeve engaged with the pushing body, the pushing body being slidable in an up and down direction, the upper sleeve having a center opening through which the pushing body extends, the upper sleeve being secured to the outer sleeve at a lower end thereof, the outer sleeve being provided with a plurality of lower receiving blades having tapered top ends, the plurality of lower receiving blades being arranged annularly at an outer periphery of the penetration opening of the outer sleeve and being separated from each other by lower insertion intervals extending in an up and down direction, a flat portion having the same level as the lower receiving blades being formed at an end that is arranged annularly of the lower receiving blades, the pushing body being further provided with a fitting piece projecting from a lower surface of the pushing body, and when the pushing body is pushed towards the nozzle stem, the pushing body is pushed to the lower receiving blades and the fitting piece is transferred from between upper receiving blades provided on an inner upper surface of the upper sleeve, and arranged annularly on that surface, to a lower insertion interval between lower receiving blades on the outer sleeve, the fitting piece also moving annularly along the tapered top ends of the lower receiving blades, and wherein, during release of pushing operation, the fitting piece is moved upward and annularly to an insertion interval between the upper receiving blades on the upper sleeve, the lateral movement occurring when the fitting piece contacts a lower tapered surface provided on the upper receiving blades, and wherein the fixed amount injection of the aerosol content is disabled after pushing on the pushing body a predetermined number of times, after which annular movement of the pushing body is disabled when the fitting piece enters a last lower insertion interval and engages

the flat portion, which prevents further annular movement of the fitting piece.

The pushing body may be formed with a pushing projection at an upper surface thereof to be in pressurized contact with a user. The pushing projection of the pushing body may be formed in coupling with the fitting piece. The pushing body may be formed with the pushing projection and the fitting piece, which are formed separately.

This invention simplifies the mechanism by injecting the whole amount each time with the fixed amount injection valve contained in the aerosol container main body and further, prevents the distributing apparatus from being damaged due to the influence of external temperature. This invention, with the simple safe mechanism, advantageously renders the aerosol container usable safely for a long time and renders the manufacturing costs inexpensive by limiting the number of injections for fixed amount in one cycle and by preventing the aerosol contents from being used in an amount more than the prescribed amount, where medical products, hair care products, cosmetic products, etc. which are not suitable for use of a prescribed amount or more, are used as aerosol contents.

Brief Description of the Drawings

Fig. 1 is an exploded perspective view showing the first embodiment of the invention;

Fig. 2 is a cross section showing the first embodiment of the invention in an assembled state;

Fig. 3 is a cross section showing a fixed amount injection state;

Fig. 4 is a cross section showing a state that a fitting piece hits a flat portion after completion of fixed amount injection for one cycle;

Fig. 5 is an exploded view showing a state that the fitting piece is disposed at an upper flat portion;

Fig. 6 is an exploded view showing a state that the fitting piece fits to a lower insertion interval;

Fig. 7 is an exploded view showing a state that the fitting piece hits the flat portion;

Fig. 8 is an exploded view showing the second embodiment of the invention;

Fig. 9 is an exploded view showing a state that the fitting piece fits into an upper insertion interval in the second embodiment;

Fig. 10 is an exploded view showing a state that the fitting piece hits the flat portion in the second embodiment; and

Fig. 11 is a perspective view showing a pushing projection portion in the second embodiment.

Detailed Description of the Invention

Referring to Fig. 1 through Fig. 7, a first embodiment using a hair growth agent injected plural times during one use cycle but subjecting to limitation of the whole use amount of injections during the plural times, is described hereinafter. Numeral 1 is an aerosol container, and as shown in Fig. 2 to Fig. 4, a fixed amount injection valve 2 whose top end is secured to a lid 9 is disposed in the aerosol container 1. A stem 7 disposed in the fixed amount injection valve 2 is formed penetrating a stem gasket 43 provided at an inner surface of the lid 9, and an orifice 44 is arranged on an outer side of the stem gasket 43 during a non-pushing state whereas the orifice 44 is arranged as inserted in a fixed amount chamber 5 during a pushing state.

The fixed amount injection valve 2 is formed with the fixed amount chamber 5 and a content introduction chamber 6 via an annular partition gasket 4 in a housing 3. The partition gasket 4 comes in close contact to the outer periphery of the stem 7 as shown in Fig. 3 to disconnect the fixed amount chamber 5 from the content introduction chamber 6, and the orifice 44 of the stem 7 is introduced into the interior of the fixed amount chamber 5 where the stem 7 is pushed and penetrated through the partition gasket 4 during up side down use, so that the aerosol contents contained in the fixed amount chamber 5 is discharged in the whole amount to the exterior. Upon release of pushing upon the stem 7, as shown in Fig. 2, the stem 7 is returned to the original position to separate the partition gasket 4, thereby communicating the fixed amount

chamber 5 with the content introduction chamber 6, and thereby introducing the aerosol contents contained in the content introduction chamber 6 into the fixed amount chamber 5.

The content introduction chamber 6 is normally in communication with an interior of the aerosol container 1 through an introduction route 10 provided between the outer periphery of the housing 3 and an outer sleeve 8 of the housing 3. It is to be noted that in this embodiment the fixed amount injection valve 2 thus formed is used but the structure is not limited as far as a fixed amount valve 2 used in other embodiments can inject the aerosol contents of a prescribed amount to the exterior by pushing operation of the stem 7.

As shown in Fig. 2, a nozzle body 12 forming a cylindrical shape nozzle 11 is formed as connecting to an upper end of the stem 7, thereby communicating the stem 7 and the nozzle 11. An outer sleeve 14 opening a penetration opening 13 at a center thereof is secured to an upper end of the aerosol container 1 so that the nozzle body 12 and the stem 7 penetrate the penetration opening 13. This nozzle body 12 is disposed so as to be movable in an up and down direction in the penetration opening.

The nozzle 11 is inserted from an insertion opening 16 formed at a center of a substrate 21 of the pushing body 15, thereby arranging the pushing body 15 as to face to the penetration opening 13 of the outer sleeve 14. A coil spring 20 is provided, as wound, between a shoulder portion 17 of the nozzle body 12 and an engagement step 18 formed inside the pushing body 15 to urge the pushing body toward an external direction. The pushing body 15 is, as shown in Fig. 1, formed with the insertion opening 16 at the center of the substrate 21, with four pushing projections 23 as a united body on an outer peripheral surface of the insertion opening 16, and with an annular wall 19 formed in a projecting manner on a lower surface of the outer periphery thereof. Fitting pieces 22 are formed on a lower surface of the substrate 21 of the pushing body 15 as projecting toward an axial direction of the lower surface.

The pushing projections 23 of the pushing body 15 are inserted into a center opening 25 formed at an upper surface of an upper sleeve 24, and as shown in Fig. 2, the upper sleeve 24 is

secured to the outer sleeve 14 by engaging engagement receiving portions 28 formed at a lower portion on the outer peripheral surface of the upper sleeve 24 with engagement projections 27 formed on an inner side of an outer side wall 26 of the outer sleeve 14. The pushing body 15 is isolated from the upper sleeve 24 in the center opening 25 of the upper sleeve 24 thus secured, and is arranged so as to be movable in the up and down direction as urged by the coil spring 20.

As shown in Fig. 1, lower receiving blades 31 whose upper end 30 has a tapered portion on one side is formed in a projecting manner on an outer periphery of the penetration opening 13 formed in the outer sleeve 14. The lower receiving blades 31 are arranged annularly via lower insertion intervals 32, and are placed so that a lower end of the fitting pieces 22 formed as projecting at the pushing body 15 can be inserted into the lower insertion intervals 32. Where the outer periphery of the penetration opening 13 is divided into three parts, the lower receiving blades 31 are continuously formed by ten pieces at each part with the lower insertion intervals 32, and flat portions 33 having the same level as the lower receiving blade 31 are formed at each end of one section at which no lower receiving blade 31 is continuously formed. Outer sleeve projections 34 formed in a projecting manner in a vertical direction are formed in continuation with the flat portions 33.

As shown in Fig. 5, upper receiving blades 36 whose lower end surface 35 is a tapered portion on one side in the opposite direction to the direction of the lower receiving blades 31 are formed in a projecting manner in the lower end direction at a lower end of the outer periphery of the center opening 25 of the upper sleeve 24. The upper receiving blades 36 are arranged annularly via upper insertion intervals 37 to which the fitting pieces 22 of the pushing body 15 can fit, and are continuously placed by ten pieces, divided into three parts, at each part at a lower end of the outer periphery of the center opening 25. Upper flat portions 42 having the same level of the upper end of the upper insertion intervals 37 are formed at each end of one section of the upper receiving blades 36.

With the outer sleeve 14 and the upper sleeve 24 thus structured, as shown in Fig. 1,

engagement recess grooves 40 formed as recesses extending in the axial direction in the inner side wall 38 of the outer sleeve 14 are formed at three locations with equal intervals, and engagement projections 41 formed as extending in the axial direction of the inner side surface of the upper sleeve 24 are arranged at locations corresponding to the engagement recess grooves 40. The lower receiving blades 31 and the upper receiving blades 36 are positioned to aligned locations by engaging the engagement recess grooves 40 and the engagement projections 41 with one another. This positioning is done by engaging the engagement projections 41 with the engagement recess grooves 40 to connected the upper sleeve 24 to the outer sleeve 14 in a not pivotal manner, as shown in Figs. 5 to 7 to dispose the upper insertion intervals 37 of the upper sleeve 24 as corresponding to the lower receiving blades 31 of the outer sleeve 14, to dispose the lower insertion intervals 32 of the outer sleeve 14 as corresponding to the upper receiving blades 36, and to dispose the upper flat portions 42 to positions corresponding to the outer sleeve projections 34.

With the structure thus described, to perform subdivided fixed amount distributing injection of the aerosol contents, the pushing body 15 is moved pivotally in advance before the pushing body 15 is started to be pushed, and the fitting piece 22 of the pushing body 15 is arranged as shown in Fig. 5 between the lower receiving blade 31 and the upper flat portion 42 adjacent to the outer sleeve projection 34. Because the pushing body 15 is in a non-pushing state at that time, the fixed amount injection valve 2 disposed inside the aerosol container 1 is in a state that the fixed amount chamber 5 still contains the aerosol contents.

The aerosol container 1 is placed up side down, and as shown in Fig. 3, the pushing body 15 is pushed in a direction in opposition to the urging force of the coil spring 20, while rendering the pushing projections 23 formed at the pushing body 15 in contact with an injection target 29, such as a head of human being. The pushing of the pushing projections 23 gives a massage effect to the injection target 29. The pushing moves the fitting piece 22 towards the outer sleeve 14 and the fitting piece 22 engages the upper end surface 30 of the lower receiving

blade 31, so that the fitting piece 22 slides into the lower insertion interval 32 along the tapered portion formed at the upper end surface 30. The fitting piece fits in the lower insertion interval 32, as shown in Fig. 6.

Pushing on the pushing body 15, as shown in Fig. 3, moves the nozzle body 12 and the stem 7 toward the bottom of the aerosol container 1. According to this movement, the orifice 44 that is disposed in the external direction of the stem gasket 43 at a time of non-pushing state is then disposed inside the fixed amount chamber 5, and contacts to the aerosol content in the fixed amount chamber 5. At the same time, the stem 7 penetrates the partition gasket 4 and cuts off communication between the content introduction chamber 6 and the fixed amount chamber 5. Therefore, the whole amount of the aerosol content contained in the fixed amount chamber 5 is injected out of the nozzle 11 of the nozzle body 12 through the orifice 44 and the introduction opening of the stem 7.

When the pushing operation stops upon completion of injection, the pushing body 15 moves toward the upper sleeve 24 by the urging force of the coil spring 20 as shown in Fig. 2, and the nozzle body 12 and the stem 7 are returned to their original positions by the urging force of a stem spring 46. The fitting piece 22 disposed to the lower insertion interval 32 due to contact to the lower receiving blade 31 during the pushing operation is moved toward the upper sleeve 24, and engages the upper receiving blade 36 located next to the upper flat portion 42 positioned before the pushing operation. The fitting piece 22 slides into the next upper insertion interval 37 along the portion tapered on one side formed at the lower end surface 35 of the upper receiving blade 36, and fits to the upper insertion interval 37 as shown with a single dotted line in Fig. 5. With the steps described above, the pushing operation of the pushing body 15 and release of the pushing operation are completed.

Thus, with repeated pushing operation of the pushing body 15, the fitting piece 22 moves sequentially between the upper insertion interval 37 and the lower insertion interval 32, and if the pushing body 15 is further pushed after the reciprocal movement occurs ten times, the fitting

piece 22 engages the flat portion 33 formed at the outer sleeve 14 as shown in Fig. 4 and Fig. 7. Therefore, the pushing body 15 moves toward the bottom of the aerosol container 1, opposing the urging force of the coil spring 20, but as shown in Fig. 4, the nozzle body 12 and the stem 7 cannot be moved toward the bottom of the aerosol because the fitting piece 22 remains on the flat portion 33, preventing the fixed amount valve 2 from opening, so that the aerosol contents cannot be injected. The use of the aerosol container 1 for one cycle is completed at that time, and no further injection of the aerosol contents can occur, so that this apparatus can prevent the aerosol content from being used more than the prescribed amount.

Where use of one cycle is completed as described above, no further use occurs, and as shown in Fig. 7, the pushing body 15 cannot be moved pivotally in the opposite direction of movement because the fitting piece 22 hits the outer sleeve projection 34 formed on the flat portion 33. Accordingly, to start the next use, the pushing body 15 is placed in a non-pushing state, and moved pivotally in a direction opposite to the movement direction by manual handling, thereby repositioning, as shown in Fig. 5, the fitting piece 22 between the outer sleeve projection 34 and the upper flat portion 42 at which the fitting piece 22 is originally provided. This procedure starts allows the start of the next cycle of use.

As described above, by pushing the pushing body 15 continuously after the fitting piece 22 is placed between the lower receiving blade 31 and the upper flat portion 42 adjacent to the outer sleeve projection 34 at the beginning, the fixed number of injections of the aerosol content can be made ten times in total. The injection amount of the aerosol content used in a prescribed period can be limited to a prescribed amount, so that the risk that the aerosol content is used more than the prescribed amount in one cycle can be avoided. For example, where the head of a human being is the injection target 29, the aerosol content of the total injection amount in one cycle can reach the whole head with ten injections, changing the injection direction at each injection.

To restart the next cycle, a special procedure is required in which the pushing body 15 is

moved pivotally in the reverse direction to the preceding direction of the previous cycle, and risk of excessive use amount can be avoided because the user recognizes that it is important to use the contents within the prescribed amount by this procedure.

In the above first embodiment, as shown in Fig. 1, the pushing projection 23 and the fitting piece 22 are integrally formed, the pushing projections 23 formed securely on the upper surface of the substrate 21 formed on the pushing body 15 as a united body, but in a second embodiment described below, the pushing projection 23 and the fitting piece 22 are formed as separate members. The pushing projection 23 is formed with a center opening 47 at a center of a disc plate 39 as a separate body from the substrate 21, and with six cylindrical projections projecting on the upper surface. An engagement piece 48 is formed as projecting in an axial direction on the lower bottom surface of the pushing projection 23, and three engagement openings 50 provided in the substrate 21 are arranged annularly for inserting, i.e., receiving, the engagement piece 48 at the periphery of the insertion opening 16 formed at a center of the substrate 21. Three fitting pieces 22 are arranged as projecting in the axial direction of the lower surface at equal intervals on the lower surface of the substrate 21 in substantially the same way as in the first embodiment. The substrate 21 and the pushing projection 23 are assembled to the aerosol container 1 upon engagement of the engagement opening 50 and the engagement piece 48.

With the structure thus constituted, because the engagement piece 48 is movable freely in a range according to the formed length of the engagement opening 50, the pushing projection 23 can move pivotally, independent of the substrate 21 in a prescribed range. If the pushing body 15 is pushed, as shown in Fig. 9, the fitting piece 22 positioned at the upper insertion interval 37 moves along the tapered portion formed at the upper end surface 30 of the lower receiving blade 31 and fits to the lower insertion interval 32, but the pushing projection 23 does not necessarily move pivotally according to the movement of the fitting piece 22 because the pushing projection 23 is isolated from the substrate 21. That is, the pushing projection is a component independent

of the substrate 21.

In a case where the pushing projection 23 contacts the injection target 29 during pushing injection operation, moving the fitting piece 22 over the plural insertion intervals 32 may not happen as far as it is in the range of the formed length of the engagement opening 50 even where the pushing projection 23 moves to some extent. Because the substrate 21 is formed separately from the pushing projection 23, an unfavorable condition in which the fitting piece 22 moves to the next fitting position according to pivotal movement of the pushing projection 23 can be avoided, even where the pushing projection 23 is inadvertently moved pivotally in the range of the formed length of the engagement opening 50 in a state that injection is not performed. Therefore, the number of predetermined injections per one cycle of use cannot be changed, even where the pushing projection 23 moves pivotally to some extent, so that the whole injection amount of the aerosol contents to be injected at one cycle of use can be maintained at a constant amount.

In this embodiment, in substantially the same way as in the first embodiment, the pushing operation of the pushing body 15 is disabled after ten pushing operations until the fitting piece 22 reaches the flat portion 33 as shown in Fig. 10. Use of one cycle is therefore completed at that time. To start use of the subsequent cycle, because the fitting piece 22 is required to be positioned at the subsequent fitting position, the pushing body 15 is placed in a non-pushing state, and the pushing projection 23 is moved pivotally in the same direction as the proceeding direction of the fitting piece 22 of the pushing projection 23 by manual handling.

The engagement piece 48 formed at the pushing projection 23 engages an inner peripheral end surface 51 of the engagement opening 50 formed at the substrate 21, so that according to the pivotal movement of the pushing projection 23, the substrate 21 also pivotally moves in the same direction. With this pivotal movement, the fitting piece 22 rides over the outer sleeve projection 34 and rides over an inclined projection 52 along the tapered portion formed at a lower end of the center opening 25 of the upper sleeve 24, and as shown in Fig. 9, fits to the upper insertion

interval 37 serving as the subsequent fitting position. With the above steps, the user can commence the next cycle of use.

It is to be noted that to give stimulations to the head skin during use, four projections in the first embodiment, and six projections in the second embodiment as shown in Fig. 11 are formed, but in other embodiments, the pushing projection 23 can be formed in other shapes, and the number of projections cannot be limited to a certain number.